

HOW SIMILAR IS THE SAPROXYLIC BEETLE FAUNA ON OLD OAKS (*QUERCUS* SPP.) IN TURKEY AND SWEDEN?

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RÉSUMÉ. — *Quelle similitude de la faune saproxylique des vieux chênes (Quercus spp.) entre la Turquie et la Suède?* — Le nombre des vieux chênes a chuté durant le siècle passé et les insectes saproxyliques associés au chêne sont l'un des groupes d'organismes les plus menacés dans l'ensemble de l'Europe et en Turquie. Les coléoptères des vieux chênes creux ont été étudiés en Suède et en Turquie avec des pièges à vitre et des pièges-fosses. Les familles les plus riches en espèces furent les *Anobidae* et les *Tenebrionidae*. Le nombre d'espèces de coléoptères saproxyliques était plus élevé sur les sites turcs que sur les suédois. Cela était le plus évident pour les *Elateridae*, *Cleridae*, *Anobiidae* et *Tenebrionidae*. Le recouvrement des listes de coléoptères saproxyliques entre les sites turcs et suédois était faible. Seules 14 (8%) des 166 espèces trouvées étaient communes aux sites des deux pays, la plupart étant des *Tenebrionidae*. Beaucoup des coléoptères trouvés sont des espèces rares qui figurent sur les listes rouges de beaucoup de pays européens. Un bon exemple en est *Limoniscus violaceus* trouvé sur l'un des sites turcs. C'est un coléoptère très rare sur l'ensemble de son aire de répartition européenne et il est inscrit en Annexe II de la Directive Habitat de la Communauté européenne. Trois espèces de la famille des *Staphylinidae* étaient nouvelles pour la science et ont été décrites comme *Hesperus gozukai*, *H. turcicus* et *H. auricomus*.

Mots-clés: Saproxyliques, vieux chênes, comparaison, Europe.

SUMMARY. — The number of old oaks has decreased during the last century and the saproxylic insects associated with the oak are one of the most endangered organism group all over Europe and Turkey. The beetle fauna on old hollow oaks was studied in Sweden and Turkey with window- and pit-fall traps. The most species rich families in the study were *Anobidae* and *Tenebrionidae*. The number of saproxylic beetle species was higher at the Turkish sites in comparison with the Swedish. This was most obvious for the families *Elateridae*, *Cleridae*, *Anobiidae* and *Tenebrionidae*. The overlap among the saproxylic beetle species at the sites in Turkey and Sweden was small. Only 14 (8%) of the 166 species found were shared between the sites in the two countries, most of them being *Tenebrionidae*. Many of the found beetle species are very rare and can be found on national redlists in many European countries. One good example is the Violet click beetle (*Limoniscus violaceus*) found at one of the Turkish sites. It is a very rare beetle all over its European range and is listed in Annexe II of the EC Habitat Directive. Three species from the family *Staphylinidae* were new to science and have been described as *Hesperus gozukai*, *H. turcicus* and *H. auricomus*.

Keywords: Saproxylics, old oaks, comparison, Europe.

Old oaks are exceptionally species-rich in Europe, but the habitat in most countries has declined substantially. Saproxylic insects associated with old trees is one of the most endangered invertebrate groups in Europe, as their habitat has severely decreased (McLean & Speight, 1993). Old oaks (*Quercus robur* L.) harbour the most diverse fauna of beetles associated with old trees in Sweden (Palm, 1959) and a large proportion of the red-listed saproxylic insect species (Jonsell *et al.*, 1998; Gårdenfors, 2000; Ranius & Jansson, 2000). These insects are living in fungal fruit bodies, dead wood outside the tree (in branches or parts of the trunk) or

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inside the tree in hollows (Palm, 1959; Speight, 1989; Dajoz, 2000). When oaks age, hollows in the trunks fill with wood mould, i.e. wood softened by decomposing fungi, often with remains from animal nests and insect fragments and droppings from insect larvae. The beetle fauna in tree hollows has received the interest of entomologists for a long time, but only recently with quantitative methods (Ranius & Jansson, 2000; Ranius, 2001; Brustel, 2004; Jonsell, 2004).

Many species dependent on large, old and hollow trees have survived in small remnant woodlands of ancient trees, often in the agricultural landscape (Speight, 1989; Warren & Key, 1989). In Sweden, old hollow oaks have decreased severely since the beginning of the 19th century. The reason is that from 1558 until 1830, all the oaks on peasant land belonged to the Swedish Crown, and were forbidden to cut down without permission. When this ban disappeared, nearly all old oaks were felled by the landowners as a result of the disapproval of the long cutting ban (Eliasson & Nilsson, 2002). However, the oaks on the land of the nobility were not included in the ban and the oaks were instead seen as a valuable resource. This makes it still possible to find relatively large oak stands with high densities of old trees in Sweden, also from a European point of view, that contain a rich saproxylic fauna.

Large parts of Turkey are intensively grazed since many centuries and old trees are very rare. But in some areas patches with old oaks can still be found. Most of the old broad leaved deciduous trees in Turkey are regularly pollarded. The forestry have quite late started to reforest the landscape. In this process many of the last sites with pollarded oaks are transformed to pine (*Pinus brutia*) or cedar (*Cedrus libani*) plantations. The beetle fauna associated with old oaks in Turkey is virtually unknown but very threatened.

The aim of this study was to compare the saproxylic beetle fauna on Turkish oaks with similar habitat in Sweden.

METHODS

In each country two sites with old oaks were surveyed (Fig. 1). The studied trees were all hollow oaks. In Sweden it was *Quercus robur* and in Turkey they were *Quercus cerris*, *Q. infectoria* and *Q. ithaburensis*. At two sites in Sweden and two in Turkey 10 trees were examined with one trap of each type per tree during one season. The Swedish sites were surveyed in 1994 and 2002 and the Turkish sites in 2005. This trap effort caught in average 77% of the saproxylic beetle species in another study in Sweden (Ranius & Jansson, 2002). The window traps consisted of a 30x60 cm wide transparent plastic plate with a tray underneath (Jansson & Lundberg, 2000). They were placed near the trunk (< 1 m), beside or in front of a cavity entrance (Fig. 2a). Their positions were 1.5-7 m from the ground, depending on where the cavity entrance was situated on the studied tree.

The pitfall traps were plastic cups with a top diameter of 6.5 cm. They were placed, in the wood mould in the bottom of the cavity, with the opening on level with the wood mould surface (Fig. 2b).

Both types of traps were partially (about 1/2 of the volume) filled with ethylene glycol and water (50:50 v/v), adding some detergent to reduce surface tension. The traps were placed in the trees in the end of April, were emptied every third week and eventually removed in the middle of August. As the sampling did not cover the entire flight periods for all species, some early and late species may not be represented in the material.

RESULTS

Only preliminary results can be presented as the analyses are not finished. The comparisons are made for 13 beetle families.

The most species rich families in the study were Anobiidae and Tenebrionidae. The overlap among the saproxylic beetle species at the sites in Turkey and Sweden was small. Only 14 (8%) of the 166 species found were shared between the countries (Fig. 3 & Appendix). The family Tenebrionidae represented most of the shared species.

The number of saproxylic beetle species was higher at the Turkish sites in comparison with the Swedish. This was most obvious for the families Elateridae, Cleridae, Anobiidae and Tenebrionidae. The Turkish sites had 77 species each from the 13 surveyed families and the Swedish had 58 and 52 species respectively.

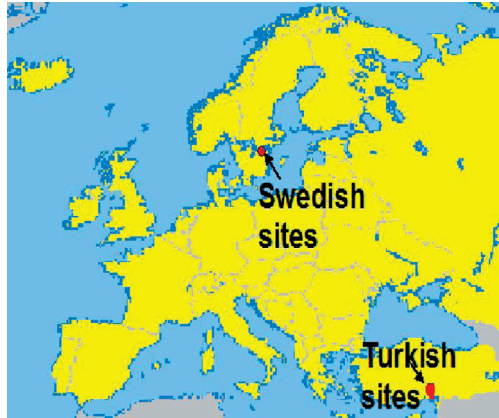


Figure 1. — The location of the Swedish and Turkish sites.

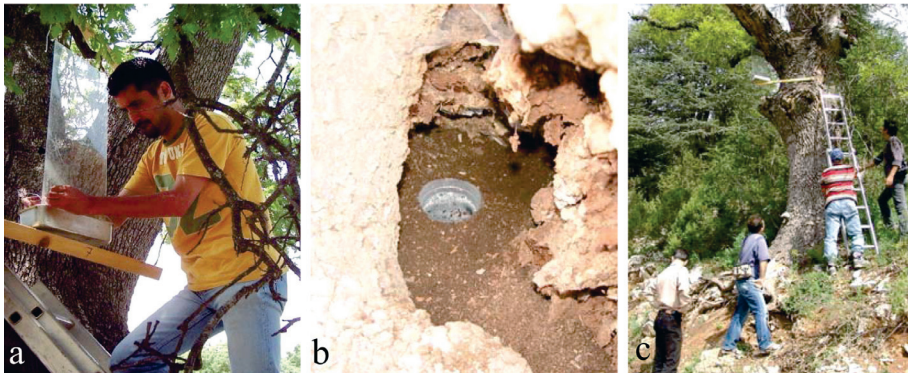


Figure 2. — a) mounting a window trap, b) a pit-fall trap inside a hollow oak, c) working with the traps on an old oak.

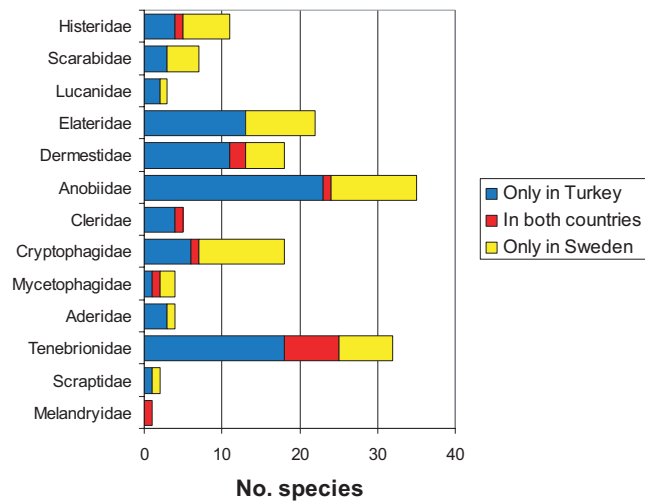


Figure 3. A comparison of the number of oak living saproxylic beetle species among 13 families caught in a survey of hollow oaks in Turkey and Sweden.

Many of the species found at Turkish sites are very rare and threatened in other parts of Europe. A good example of this is the Violet rose chafer (*Eupotosia mirifica*), a very rare species and today only known from 14 sites in the whole Mediterranean region (Fig. 4).

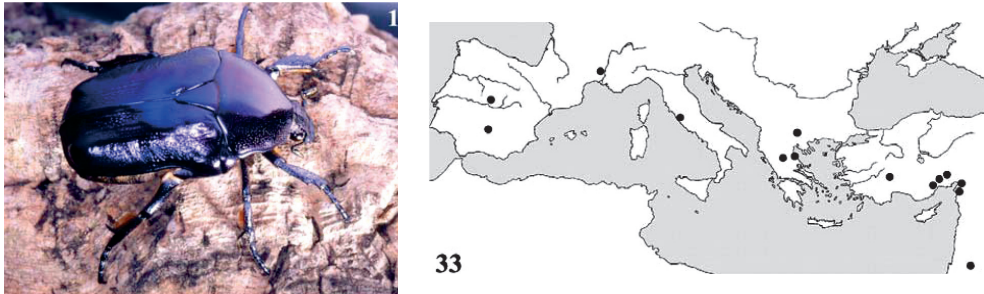


Figure 4. — The Violet rose chafer (*Eupotosia mirifica*) and the modern distribution for the species. Pictures from Tassi *et al.* (2004).

Another example of an interesting beetle found, is the Violet click beetle (*Limoniscus violaceus*), a very rare beetle all over its European range, listed in Annexe II of the EC Habitat Directive. The species is considered to be a so-called “*Urwaldtier*” with high conservation value (Whitehead, 2002). Three species from the family Staphylinidae were new to science and have been described as *Hesperus gozukai*, *H. turcicus* and *H. auricomus* (Schillhammer *et al.*, 2007; Fig. 5).

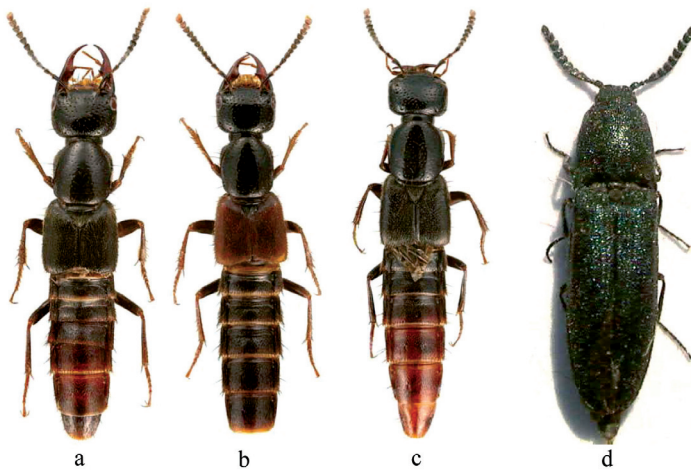


Figure 5. — a) *Hesperus gozukai*, b) *Hesperus turcicus*, c) *Hesperus auricomus* - beetles new to science and d) *Limoniscus violaceus* – a very rare beetle all over its European range, listed in Annexe II of the EC Habitat directive.

These results show that the Turkish sites with old oaks are very species-rich, have unique species and have a high conservation value in a European perspective.

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APPENDIX

Beetle species living on old oaks found in two areas in Sweden and two in Turkey

Family	Species	Turkey - Kizilen	Turkey- Derbent	Sweden - Bjärka Säby	Sweden - Händelö
HISTERIDAE	<i>Cyclobacanius soliman</i> Marseul	x			
	<i>Gnathoncus nannetensis</i> Marseul			x	x
	<i>Gnathoncus buyssoni</i> Auzat			x	x
	<i>Gnathoncus nidorum</i> Stockman			x	
	<i>Dendrophilus punctatus championi</i> Lewis	x	x	x	x
	<i>Dendrophilus pygmaeus</i> L.				x
	<i>Paromalus simplicistrius</i> Schmidt	x	x		
	<i>Paromalus flavicornis</i> Herbst			x	x
	<i>Carcinops pumilio</i> Erichson	x			
	<i>Myrmetes paykulli</i> Kanaar				x
	<i>Epiechinus fulvosetosus</i> Sahlberg		x		
	<i>Margarinotus brunneus</i> Fabricius			x	
	<i>Merohister ariasi</i> Mars	x	x		
SCARABAEIDAE	<i>Propomacrus bimucronatus</i> Pallas	x			
	<i>Osmoderma eremita</i> Scopoli			x	x
	<i>Trox scaber</i> L.			x	x
	<i>Liocola marmorata</i> Fabricius			x	x
	<i>Potesia cuprea</i> Fabricius				x
	<i>Protaetia speciosa</i> Adams	x	x		
LUCANIDAE	<i>Protaetia mirifica</i> Mulsant		x		
	<i>Dorcus parallelipedus</i> L.	x	x		
	<i>Dorcus peyroni</i> Reiche & Saulcy	x			
ELATERIDAE	<i>Sinodendron cylindricum</i> L.			x	x
	<i>Pittonotus theseus</i> Gm.	x	x		
	<i>Mulsantheus manuelae</i> Plat & Gl.	x	x		
	<i>Melanotus fuscipes</i> Gl.	x	x		
	<i>Melanotus fraseri</i> Platia & Schimmel		x		
	<i>Melanotus villosus</i> Geoff.				x
	<i>Melanotus castanipes</i> Paykull			x	x
	<i>Reitterelater dubius</i> Plat & Cate	x	x		
	<i>Haterumelater fulvago</i> Marseul	x			
	<i>Elater fuliginosus</i> L.			x	
	<i>Ampedus hjorti</i> Rye			x	x
	<i>Ampedus cardinalis</i> Schiödte			x	x
	<i>Ampedus nigroflavus</i> Goeze				x
	<i>Ampedus balteatus</i> L.			x	
	<i>Proceraerus tibialis</i> Locardaire			x	x
	<i>Calambus bipustulatus</i> L.			x	
	<i>Ectamenogonus montandoni</i> Buys.	x			
<i>Ischnodes sanguinicollis</i> Panzer	x	x			
<i>Limoniscus violaceus</i> Ph.W. Müller	x	x			
<i>Lacon ladae</i> Mr & Dus		x			
<i>Adelocera pygmaea</i> Baudi	x	x			
<i>Peripontius terminatus</i> Erichson		x			
<i>Cardiophorus kindermanni</i> Stierlin	x	x			

Family	Species	Turkey - Kizilen	Turkey- Derbent	Sweden - Bjärka Säby	Sweden - Händelö	
DERMESTIDAE	<i>Dermestes lardarius</i> L.			x		
	<i>Dermestes erichsoni</i> Ganglbauer	x				
	<i>Attagenus quadrimaculatus</i> Kraatz	x	x			
	<i>Attagenus unicolor</i> Brahm	x				
	<i>Attagenus brunneus</i> Faldermann	x				
	<i>Megatoma undata</i> L.			x	x	
	<i>Megatoma ruficornis</i> Aubé		x			
	<i>Ctesias serra</i> Fabricius			x	x	
	<i>Ctesias syriaca</i> Ganglbauer	x	x			
	<i>Ctesias maculifasciata</i> Reitter	x				
	<i>Anthrenus scrophulariae</i> L.	x	x	x	x	
	<i>Anthrenus museorum</i> L.			x	x	
	<i>Anthrenus verbasci</i> L.	x				
	<i>Anthrenus delicatus</i> Kiesenwetter	x	x			
	<i>Anthrenus flavidus</i> Solskij			x		
	<i>Globicornis picta</i> Küster	x	x			
	<i>Globicornis nigripes</i> Fabricius			x	x	
	<i>Globicornis emarginata</i> Gyllenhal				x	
	<i>Trogoderma glabrum</i> Herbst	x	x			
	ANOBIIDAE	<i>Ptinus bidens</i> Olivier	x	x		
		<i>Ptinus variegatus</i> Rossi	x	x		
		<i>Ptinus frivaldszkyi</i> Reitter	x	x		
<i>Ptinus bruchi</i> Pic			x			
<i>Ptinus basilaris</i> Pic		x	x			
<i>Ptinus spitzvi</i> Villa		x				
<i>Ptinus bicinctus</i> Sturm			x			
<i>Ptinus calcarifer</i> Reitter			x			
<i>Ptinus sexpunctatus</i> Panzer					x	
<i>Ptinus rufipes</i> Olivier				x	x	
<i>Ptinus fur</i> L.				x	x	
<i>Ptinus subpilosus</i> Sturm				x	x	
<i>Dignomus irroratus</i> Kiesenwetter*			x			
<i>Hedobia imperialis</i> L.				x	x	
<i>Hedobia pubescens</i> Oliver			x			
<i>Gastrallus immarginatus</i> Müller				x		
<i>Falsogastrallus unistriatus</i> Zoufal		x	x			
<i>Xestobium rufovillosum</i> De Geer				x	x	
<i>Hemicoelus canaliculatus</i> Thomson				x	x	
<i>Hadrobregmus pertinax</i> L.				x		
<i>Mesothes granulatus</i> Pic		x	x			
<i>Xyletinus laticollis</i> Dufschmid*		x	x			
<i>Xyletinus pectinatus</i> Fabricius				x	x	
<i>Lasioderma serricornis</i> Fabricius		x				
<i>Oligomerus ptilinooides</i> Wollaston		x	x			
<i>Stagetus franzi</i> Espanol		x	x			
<i>Stagetus elongatus</i> Mulsant & Rey		x	x			
<i>Stagetus byrrhoides</i> Mulsant & Rey		x				
<i>Stagetus dorcatomides</i> Brenske & Reitter***		x				

Family	Species	Turkey - Kizilen	Turkey- Derbent	Sweden - Bjärka Säby	Sweden - Händelö
	<i>Dorcatoma setosella</i> Mulsant & Rey	x			
	<i>Dorcatoma flavicornis</i> Fabricius			x	x
	<i>Dorcatoma chrysomelina</i> Sturm	x	x	x	x
	<i>Dorcatoma</i> sp.1	x			
	<i>Dorcatoma</i> sp.2		x		
	<i>Caenocara affine</i> Sturm**	x			
CLERIDAE	<i>Korynetes caeruleus</i> De Geer	x	x		x
	<i>Opilo taeniatus</i> Klug		x		
	<i>Tilloidea unifasciata</i> Fabricius		x		
	<i>Trichodes suspectus</i> Escherich		x		
	<i>Trichodes holtzi</i> Hintz	x	x		
CRYPTOPHAGIDAE	<i>Cryptophagus pallidus</i> Sturm	x	x		
	<i>Cryptophagus thomsoni</i> Reitter		x		
	<i>Cryptophagus lycoperdi</i> Scop.	x			
	<i>Cryptophagus brucki</i> Reitter	x			
	<i>Cryptophagus immixtus</i> Rey	x	x		
	<i>Cryptophagus hexagonalis</i> Tourn.	x			
	<i>Cryptophagus quercinus</i> Kraatz			x	x
	<i>Cryptophagus badius</i> Sturm			x	x
	<i>Cryptophagus populi</i> Paykull				x
	<i>Cryptophagus pubescens</i> Sturm				x
	<i>Cryptophagus micaceus</i> Rey			x	x
	<i>Cryptophagus saginatus</i> Sturm			x	x
	<i>Cryptophagus confusus</i> Bruce				x
	<i>Cryptophagus dentatus</i> Herbst				x
	<i>Cryptophagus pseudodentatus</i> Bruce		x		x
	<i>Cryptophagus distinguendus</i> Sturm				x
	<i>Cryptophagus scanicus</i> L.			x	x
	<i>Cryptophagus pilosus</i> Gyllenhal				x
MYCETOPHAGIDAE	<i>Mycetophagus quadriguttatus</i> Müll.	x	x		x
	<i>Mycetophagus quadripustulatus</i> L.	x			
	<i>Mycetophagus piceus</i> Fabricius			x	x
	<i>Mycetophagus populi</i> Fabricius				x
ADERIDAE	<i>Euglenes</i> sp. cf. <i>pygmaeus</i> De Geer	x	x		
	<i>Euglenes oculatus</i> Paykull			x	x
	<i>Aderus populneus</i> Creutzer	x	x		
	<i>Otolelus rufipes</i> Rossi	x	x		
TENEBRIONIDAE	<i>Diaperis boleti</i> L.		x	x	x
	<i>Alphitophagus bifasciatus</i> Say	x		x	
	<i>Palorus depressus</i> Fabricius	x	x		x
	<i>Pentaphyllus testaceus</i> Hellvig		x	x	
	<i>Uloma culinaris</i> L.			x	
	<i>Tenebrio molitor</i> L.				x
	<i>Tenebrio opacus</i> Duftschmid			x	
	<i>Tenebrio obscurus</i> Fabricius	x	x		
	<i>Neatus inaequalis</i> Reitt	x	x		
	<i>Metaclisa azurea</i> Waltl		x		
	<i>Corticeus fasciatus</i> Fabricius			x	

Family	Species	Turkey - Kizilen	Turkey- Derbent	Sweden - Bjärka Säby	Sweden - Händelö
	<i>Blaps tibialis</i> Reiche	x			
	<i>Blaps lata</i> Seidl		x		
	<i>Helops cyanipes</i> Allard		x		
	<i>Odocnemis dasypus</i> Küst	x			
	<i>Probatiscus bodemeyeri</i> Reitter		x		
	<i>Cylindronotus incultus</i> Allard	x			
	<i>Stenosis punctiventris</i> Esch	x			
	<i>Allecula morio</i> Fabricius			x	x
	<i>Allecula striata</i> Thomson	x	x		
	<i>Prionychus ater</i> Fabricius		x	x	x
	<i>Prionychus delagrangi</i> Fairmaire		x		
	<i>Hymenalia morio</i> Redtenbacher	x	x		
	<i>Hymenalia</i> sp.	x	x		
	<i>Pseudocistela ceramboides</i> L.	x		x	x
	<i>Mycetochara linearis</i> Seidl	x	x	x	x
	<i>Mycetochara axillaris</i> Paykull			x	x
	<i>Mycetochara humeralis</i> Fabricius			x	x
	<i>Mycetochara graciliformis</i> Reitter	x			
	<i>Mycetochara quadrimaculatus</i> Latreille	x	x		
	<i>Mycetochara sulcipennis</i> Reitter	x	x		
	<i>Mycetocharina orientalis</i> Faust		x		
SCRAPTIIDAE	<i>Scraptia fuscata</i> Müller			x	x
	<i>Scraptia ophthalmica</i> Mulsant	x	x		
MELANDRYIDAE	<i>Orchesia micans</i> Panzer	x	x	x	
		77	77	52	58

* = probably living in dung; ** = probably living in fungi (Gasteromycetes); *** = may evolve in litter.

